CLAIMS

1.   A three-dimensional image displaying apparatus, comprising:

a spatial light modulation element having a discrete pixel structure and expressing a hologram;

an illumination optical system generating reconstruction light by causing illumination light to enter said spatial light modulation element that expresses the hologram; and

a reconstruction image converting optical system displaying a reconstruction image by producing a virtual image wavefront-converted from the reconstruction light,

wherein at least one of a bright point interval and initial phase value of respective bright points constituting a target reconstruction image to be displayed is set such that peaks of the reconstruction light, reaching a region where the observation of reconstruction image obtained through diffraction of a specified order in said spatial light modulation element is permitted, are produced at different plural points on a back focal plane of said reconstruction image converting optical system.

2.   A three-dimensional image displaying apparatus according to claim 1, wherein the initial phase value of each of said respective bright points, constituting the target reconstruction image, is varied as time elapses.

3.   A three-dimensional image displaying apparatus according to claim 1, further comprising a mask provided on the back focal plane of said reconstruction image converting optical system, said mask

transmitting light components reaching the peak positions, among the reconstruction light reaching within the region where the observation of reconstruction image obtained through the diffraction of the specified order is permitted, and blocking light components obtained through diffraction of a different order other than the specified order.

4. A three-dimensional image displaying method that provides a spatial light modulation element having a discrete pixel structure with a hologram, generates reconstruction light by causing illumination light to enter said spatial light modulation element, and displays a reconstruction image by said reconstruction image converting optical system producing a virtual image wavefront-converted from the reconstruction light, comprising the step of:

causing said spatial light modulation element to express a hologram capable of displaying a target reconstruction image to be displayed, by setting at least one of a bright point interval and initial value of respective bright points constituting the target reconstruction image such that peaks of the reconstruction light reaching a region, where the observation of reconstruction image obtained through diffraction of a specified order in said spatial light modulation element is permitted, are produced at different plural points on a back focal plane of said reconstruction image converting optical system.

5. A three-dimensional image displaying method according to claim 4, wherein the initial phase value of each of the respective bright points, constituting the target reconstruction image, is varied as time elapses.

6. A three-dimensional image displaying method according to

claim 4, wherein a mask, which transmits light components reaching the peak positions, among the reconstruction light reaching the region where the observation of reconstruction image obtained through the diffraction of the specified order is permitted, and which blocks light components obtained through the diffraction of a different order other than the specified order, is arranged on the back focal plane of said reconstruction image converting optical system, and

wherein the reconstruction image is displayed by means of the light components having passed through said mask.

7. A three-dimensional image displaying method according to claim 4, wherein the interval of the peak positions of the reconstruction light reaching the region, where the observation of reconstruction image obtained through the diffraction of the specified order in said spatial light modulation element on the back focal plane of said reconstruction image converting optical system, is smaller than the diameter of the pupil of an observer observing the reconstruction image.

8. A three-dimensional image displaying method according to claim 4, wherein, when the wavelength of the illumination light is λ, the focal length of said reconstruction image converting optical system is f, the pixel pitch of said spatial light modulation element is p, the diameter of the pupil of the observer observing the reconstruction image is d, and the interval of the bright points of an equal initial phase value among the bright points constituting the target reconstruction image is Np (N is an integer of two or more), the following relationship is satisfied:

$d/2 > \lambda f/(Np)$.